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1903-1904

FIRST BIENNIAL REPORT

OF

State Engineer

AND

The Carey Land Act Board

State of Montana

1903-04

"INDEPENDENT PUBLISHING COMPANY, HELENA, MONTANA."



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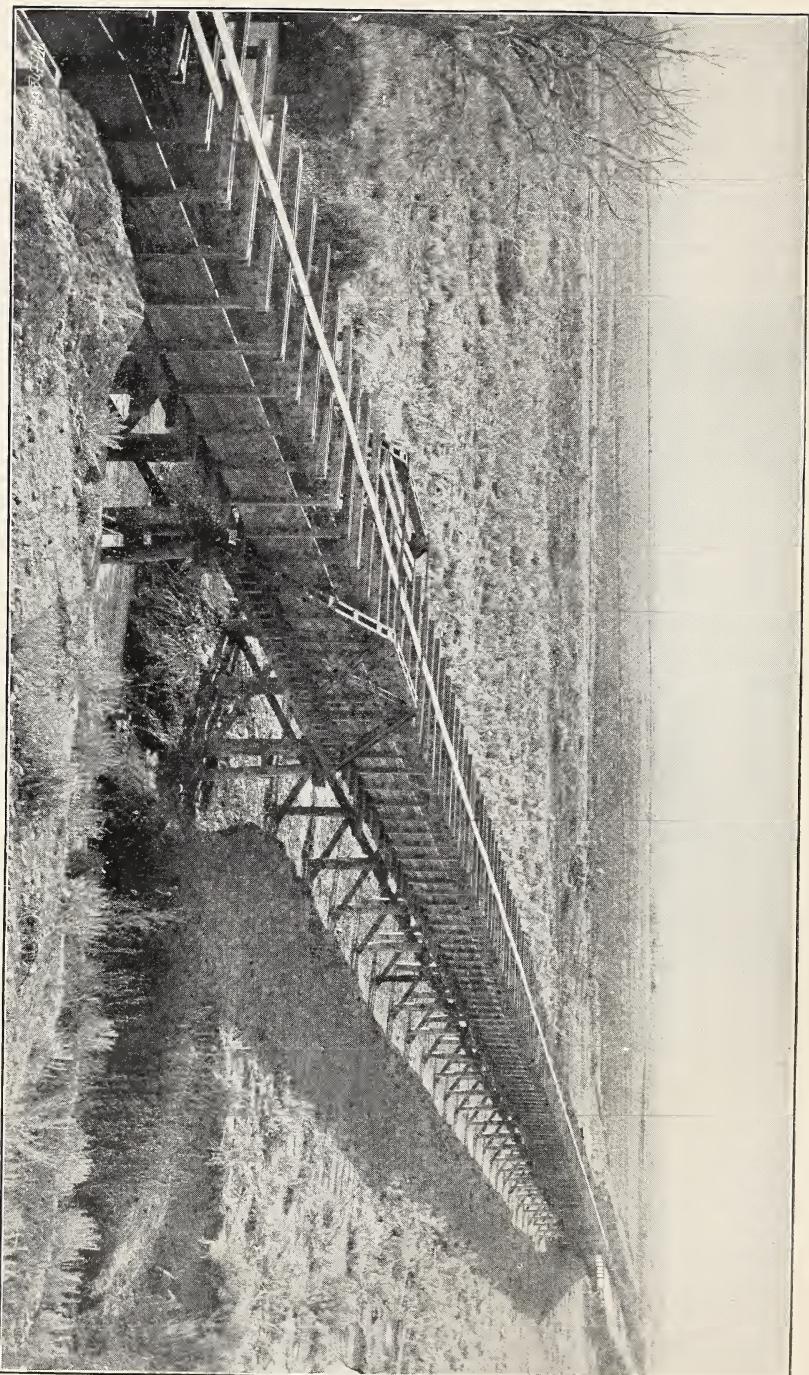


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FLUME NO. 1, ACROSS CANYON CREEK, BILLINGS LAND AND IRRIGATION COMPANY, LENGTH 600 FEET.

FIRST BIENNIAL REPORT

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State Engineer

AND

The Carey Land Act Board

State of Montana

"INDEPENDENT PUBLISHING COMPANY, HELENA, MONTANA."



First Biennial Report of the State Engineer

To His Excellency, Governor J. K. Toole.

Sir: In accordance with provisions of law, I hereby present my report of the work of this office during the two years of its existence.

The act creating the office of State Engineer seems to have contemplated that the principal duties of that officer should be those pertaining to the chairmanship of the Carey Land Act Board, and this Board ordained to succeed to the Arid Land Grant Commission, which was in the same act abolished.

The duties of said Carey Land Act Board were in fine: "To perform the same duties pertaining to unfinished contracts of said Commission as were imposed upon said Commission under the law creating said Commission, and defining its powers and duties, so far as the same may be necessary to complete such contracts or protect the State's interest."

In order that the Carey Land Act Board might address itself intelligently to the work thus assigned it, it seemed necessary that the State Engineer should first visit the districts over which hung these "unfinished contracts" for the purpose of making in each case a thorough examination as to what had been done. Contracts with the Federal government were found to exist in three districts—No. 1, near Billings; No. 2, near Big Timber; and No. 4, near Augusta.

These three localities were accordingly visited by me and a thorough examination was made in their order. In District No. 1 it was found that extensive surveys had been made, but no actual work of construction done. But the records and maps of the proposed work were quite full, and these, together with the findings of the State Engineer in the field, were laid before the Carey Land Act Board, with action by said Board as reported elsewhere under proper head.

Examination of District No. 2 at Big Timber revealed a very unsatisfactory state of affairs. The work done was also largely of an engineering character. The work of actual construction was confined to a small ditch of perhaps 30 cubic feet per second, diverted from Big Timber creek, a small tributary of the Yellowstone flowing into the Yellowstone on the north side thereof. The main body of the land composing District No. 2 is situated on the opposite side of the Yellowstone, on the left bank of the West Boulder river. The water for use on this main body (about 50,000 acres) is looked for in the said West Boulder river. These facts, together with engineering data—quite complete—left by the predecessor of this Board, were laid before the Carey Land Act Board and action taken as per their report.

In District No. 4, commonly called the Dearborn canal project, the most unsatisfactory conditions were found to prevail. First of all a complete examination into the records of this district was undertaken by the chairman and secretary of the Board. The minutes of all the meetings of the Board preceding us, together with advertisements for bids, purchases of water rights, letting of contracts, payments, bond issues, etc., were examined; following which the State Engineer made exhaustive survey and measurements of the canal in all its details—excavations, flumes, head and waste gates—and with Georke K. Reeder, a civil engineer of good reputation, made estimates upon all work done. This report containing data, together with such other matters as had a bearing on the contract with the Dearborn Canal Company, were duly reported to the Carey Land Act Board and, after formal approval by said Board, was filed with the records of said Board. For action by said Board, together with conditions now existing in the said district, and the status of relationship of the State with the said canal company, see report of the Carey Land Act Board.

Such have been the actions of the State Engineer in matters pertaining to field examinations in these several districts, and such the reports to the Carey Land Act Board, whose members have worked in the most perfect accord, all conclusions reached having been unhesitatingly unanimous.

2. The State Engineer has tried to act in accordance with suggestions of the State Board of Land Commissioners, examining and reporting each case submitted to him by the said Board; and as far as funds have permitted, he has examined the situation of State lands with respect to reclamation, and plans are now under consideration in this office to make examination of large tracts of State lands in the southern part of the State. But unless special provision be made whereby this work may be done, it must necessarily move very slowly.

About 40,000 acres of the State's lands are to be found in five townships in the locality above mentioned, which needs water to make it bring any considerable revenue to the State, either by lease or sale, and the time should not be allowed to come, although it is speedily approaching, when waters that might now be utilized in the reclamation of these lands will be otherwise appropriated by individuals or corporations, and in consequence these lands may lie a barren waste for an indefinite term of years. It is not my hope, nor design, that a large appropriation shall be made at this time to undertake the reclamation of these and similarly situated tracts of State lands, but that there may be sufficient funds provided to permit of examination within the next two years of all the more important tracts; the maps, field notes, etc., to be reported to the State Board of Land Commissioners, and at their discretion such steps to be taken as will hold the available waters for irrigation of these tracts. What this office has done on this line was done by virtue of Division 2 of Section 7 of the act creating this office—which may authorize just what is here contemplated, but if so, it is not plain where the funds are to come from to meet the expense of ‘preparing plans and specifications for such irrigation systems.’

3. The State Engineer has endeavored to acquaint himself with the water ways of the State and the needs of the State as to irrigation matters, and to this end has made, or caused to be made, measurements and calculations of the ordinary and flood discharge of a number of streams—co-operating with the United States Geological Survey and

the Montana Experiment Station at Bozeman. Little has been possible with the Geological Survey, this only by counseling and corresponding with the representatives of the Reclamation Bureau, but arrangements are made whereby this office may be more in touch with the reclamation service.

The work done in connection with the Montana Experiment Station has been more direct during the past year. I have gladly availed myself of the invaluable services of Professor John S. Baker, Irrigation Engineer of the Station, whose many years of service with the Federal Reclamation Bureau have fitted him in a peculiar manner for this work. I had consulted with Professor Baker many times during the year 1903, but no formal arrangements were made for co-operation until the beginning of the past irrigation season, when the following arrangement was made:

Agreement for Co-Operative Work of Stream Measurements in the Gallatin Valley for the Summer of 1904, Between the Irrigation Department of the Montana Experiment Station and the State Engineer of Montana.

The act of the Legislature of Montana creating the office of State Engineer specifies that he shall work in co-operation with the United States Geological Survey and the Montana Experiment Station, in a hydrographic survey of the State.

Before an adequate system of water control is established it is desirable, and before rights on our streams are adjudicated it is necessary, to know the regime of our streams. The United States Geological Survey has kept records of the regime of our larger streams for several years past, and are continuing the same, leaving the less important streams yet unsurveyed. It is believed that this latter work can be more economically and more efficiently done by the united efforts of the State Engineer and the Montana Experiment Station. Therefore the two above mentioned parties hereby enter into an agreement to co-operate in this work on the following terms:

(1). The State Engineer agrees to furnish \$1,000, and the Montana Experiment Station \$200.

(2). The Experiment Station further agrees to furnish

the services of Professor J. S. Baker in the supervision and superintendence of the work.

(3). That the money above appropriated shall be expended in the erection of permanent or temporary gauging stations on the streams which may be selected by Professor Baker and John W. Wade, State Engineer, in paying the traveling expenses of the State Engineer and Professor Baker and his assistants; in paying the salary of the assistants to be employed by Professor Baker; in paying observers of river gauges, and any other expenses incidental to the work to be done under this agreement.

(4). Duplicate copies of all data shall be made, one copy to be on file at the Experiment Station and the other copy for the State Engineer. Each party may publish all the results of the observations.

(5). The work included under this agreement shall be confined to Gallatin Valley and bordering valleys selected by Professor Baker.

JOHN W. WADE,
State Engineer.

JOHN S. BAKER,

Irrigation Engineer, Montana Experiment Station.

F. B. LINFIELD,

Director Montana Experiment Station.

Following out the terms of this agreement, Professor Baker and the State Engineer made selection of a number of gauging stations, and with the current meters of this office and those of the Experiment Station, these streams were measured—a detailed report of which by Professor Baker is here subjoined:

REPORT TO STATE ENGINEER OF MONTANA OF A
HYDROGRAPHIC SURVEY OF GALLATIN
VALLEY, MONTANA.

Mr. John W. Wade, State Engineer,
Helena, Montana.

Dear Sir:

In accordance with an agreement entered into in June, 1904, between yourself and the Montana Agricultural Experiment Station through the Irrigation Engineer, I beg to submit the following report of my work:

Most of the water of the streams of Gallatin valley is utilized for irrigation and hydraulic purposes. On most of these streams the water rights are adjudicated and the owners hold titles to given amounts of water for purposes mentioned in the decrees. There are no data of the quantities of water discharge by these streams, outside of the West Gallatin river and Middle creek, of which there is any record. These streams have been gauged each year by the engineers of the United States Geological Survey until 1904, when measurements on Middle creek were discontinued. Accordingly, the remaining streams of much importance were selected and rating or gauging stations were established. The following streams were selected: Beginning near the mouth of the West Gallatin canon and following around the valley to the east and north, were Little Bear creek, Big Bear creek, Cottonwood creek, Middle creek, Bozeman creek, Rocky Canon creek, Bridger creek and Pass creek. A rating station was also established at a highway bridge across the West Boulder river at George Knight's ranch in Park county.

Selection of Rating Stations.

In selecting the rating stations it was borne in mind to get above diversions so that the total flow should be obtained. These stations were selected as near as could be, and still have proper conditions, to some ranch house or dwelling. Straight stretches of channel were found with the banks as smooth as possible, and high enough to prevent the highest flow from overflowing them. Steep grades were avoided so that the high velocity of water would not prevent the use of the current meter.

Wherever the streams were not too large to prohibit the use of flumes because of the cost, they were built. Rating flumes were built in all of the above mentioned streams excepting Middle creek and the West Boulder river.

Requirements for a Rating Station.

In general, the requirements are that the water filaments of the stream shall be as straight as possible and that the velocity shall neither be too high nor too low for the current meter. Between one foot and eight feet per second are considered good velocities, and about two to three feet per second are much better than higher ones.

Where the natural channel is selected, the bottom should be as smooth and as free as possible from cobbles and boulders. The banks should likewise be smooth and free from brush, grass and weeds. These conditions insure that the current shall not be broken and good results will be obtained in the determination of the velocity.

Where natural conditions do not meet the requirements, flumes are placed. These should be as wide, or nearly so, as the original channel, unless it is found necessary to contract it to get the water of sufficient depth to cover the measuring instrument. The length of the flume should be from 1.5 to 2 times the width so that the water will obtain a uniform flow before reaching the lower end. The depth should be sufficient to carry all the water during the flood period with enough clearance between the water surface and the ties for floating debris. The flume should be set level in all directions and have its axis coincident with that of the stream.

The flumes in these streams were built of rough two-inch planks, spiked to sills, posts and ties. Wings were placed on the upper end and aprons projected downward from the bottom at the upper end so as to insure that all the surface flow would pass through.

Gauges were made of strips of No. 18 galvanized iron two inches wide, and graduated to feet, tenths and two-hundredths. These were fastened at an angle of 30 degrees with the horizontal on the side of the flume with the top end down stream. The angular position magnifies the height

of surface two times and makes it easier to read accurately.

Observers.

Observers were employed to make daily observations on the gauges. These observations are recorded in a notebook furnished for the purpose, and at the end of each week reports from the notes are made out on a specially printed blank postal card and mailed to the Montana Experiment Station. The following are the names of the observers on the various streams, with the pay they are receiving. The pay varies with the distance the observers are required to go to the rating station.

Stream.	Observer.	Pay per Month.
West Boulder River . . .	George Knight	\$ 5.00
Little Bear Creek	Mrs. Delia M. Badgley	4.00
Big Bear Creek	Geo. W. Spaulding.	12.00
Cottonwood Creek	Mrs. Dave Suverly	4.00
Middle Creek	Mrs. L. R. Clarke	10.00
Bozeman Creek	Robert Davidson	5.00
Rocky Canon Creek . . .	Eugene Christman	6.00
Bridger Creek	John Dawes	5.00
Pass Creek	Chloe Richards	5.00

Discharge Measurements.

The measurements of the quantity of water in the stream is usually made by the current meter. The measurement is best made at about three-fourths of the length of the flume, below the upper end, as the flow is quite steady at that place. Sufficient number of these measurements are made at different heights of water in order to get a rating for the stream. The discharges of cubic feet per second are platted as abscissa on cross section paper, with the corresponding gauge heights as ordinates—both to convenient scales. Through the points thus platted a curve is drawn called a rating curve. Then by referring to the curve a rating table is made from which the daily discharge may be computed by referring to the daily record of the gauge heights. To reduce this quantity of cubic feet per second to acree feet per day, multiply by 1.9835.

Owing to the lateness of the season when the work was begun a sufficient number of measurements could not be

obtained, as the flood season had passed. Therefore, for this season no daily discharge tables could be constructed. During the early season of 1905 the remaining measurements may be made and the tables constructed. The following are the discharge measurements made during 1904:

DISCHARGE MEASUREMENTS FOR THE YEAR 1904.

West Boulder River at George Knight's Ranch.

May 17, 1904. Gauge 2.00 feet. 257.87 cubic feet per second
May 18, 1904. Gauge 2.18 feet. 316.85 cubic feet per second
Nov. 17, 1904. Gauge 1.18 feet. 35.79 cubic feet per second

Little Bear Creek at Badgley's Ranch.

Sept. 3, 1904. Gauge 0.18 feet. 1.949 cubic feet per second
Oct. 24, 1904. Gauge 0.15 feet. 1.497 cubic feet per second

Big Bear Creek Two Miles Above Spaulding Ranch.

Sept. 3, 1904. Gauge 0.32 feet. 4.056 cubic feet per second
Oct. 24, 1904. Gauge 0.25 feet. 4.056 cubic feet per second

Cottonwood Creek at Dave Suverly's Ranch.

Aug. 5, 1904. Gauge 0.755 feet. 37.498 cubic feet per second
Sept. 3, 1904. Gauge 0.55 feet. 24.194 cubic feet per second
Oct. 24, 1904. Gauge 0.45 feet. 16.858 cubic feet per second

Middle Creek at U. S. Geological Survey Station.

Sept. 12, 1904. Gauge 0.90 feet. 44.871 cubic feet per second
Oct. 25, 1904. Gauge 0.88 feet. 37.484 cubic feet per second

Bridger Creek at John Dawe's Lime Kiln.

Sept. 9, 1904. Gauge 0.55 feet. 3.526 cubic feet per second
Oct. 25, 1904. Gauge 0.280 feet. 7.082 cubic feet per second

Bozeman Creek at Robert Davidson's Ranch.

Aug. 18, 1904. Gauge 0.53 feet. 21.328 cubic feet per second
Sept. 8, 1904. Gauge 0.43 feet. 14.914 cubic feet per second
Oct. 26, 1904. Gauge 0.38 feet. 12.215 cubic feet per second

Rocky Canon Creek at Mouth of Canon.

Aug. 20, 1904. Gauge 0.37 feet. 10.618 cubic feet per second
Sept. 8, 1904. Gauge 0.39 feet. 7.581 cubic feet per second
Oct. 26, 1904. Gauge 0.48 feet. 10.778 cubic feet per second

Pass Creek, one Mile Above Richard's House.

Aug. 23, 1904. Gauge 0.31 feet. 5.435 cubic feet per second

Sept. 10, 1904. Gauge 0.31 feet. 5.890 cubic feet per second

Respectfully submitted,

J. S. BAKER,

Irrigation Engineer.

These gauging stations are very substantially built and are to be continually observed until sufficient time shall have elapsed to enable this office to record with certainty the average flow of these streams.

The State Engineer is obligated by law to "become conversant with the water ways of the State," and it is obvious that such knowledge is useless unless it be definite; so it shall be the purpose of this office to extend these observations and measurements as far as funds provided will warrant such extension, confining my work in this particular to comparatively small streams, as suggested in the agreement between this office and the Montana Experiment Station, this office being satisfied that the gauging of the larger streams already made and being made by the United States Geological surveyors is entirely reliable.

4. This office is keeping as full records of work done as circumstances will permit, and it is my plan that all such records shall be so arranged and indexed that all matters shall be easily accessible to all who may wish to consult it.

In this connection I beg to call attention to the fact that no permanent rooms have been available for this office and no means for storing or arranging records have been provided, and unless such omissions are supplied it will be very inconvenient, not to say impossible, to intelligently arrange or to safely keep these records.

Among the reasons for the duty enjoined upon the State Engineer to become acquainted with the needs of the State as to irrigation matters, it may be safely assumed that the most important is this: That as far as possible every cubic foot of available water may be put into service upon some thirsty acre of arid land; and that where water is not to be found in any natural stream they may be diverted upon a given tract, that this fact may be known and definitely

known, so that whatever effort may be made toward its reclamation may be wholly confined to "conservation of water" in that behalf.

It is unquestionably a fact that in the State of Montana there are millions of acres of arid land not now reclaimed and every acre of the same may be watered, for the facilities are ours, and if the general government is pledged to look after those gigantic schemes that are out of our reach, we ought to address ourselves bravely to the task of subduing the rest.

Mr. George Maxwell, who, however praised and maligned (whether justly or unjustly is not mine to say), is a most enthusiastic advocate of irrigation, oftentimes putting the truth in a most impressive way, has this to say of our State:

"To illustrate conditions as they now exist, turn to Montana. There is a state with an area as large as Illinois, Indiana and Ohio combined. Those three states have a population of 9,000,000 people, which they sustain in comfort and plenty, while Montana has a population of about 250,000.

"That one state of Montana contains natural resources awaiting only their development by the hand of man, which would provide within the next 10 years, if need be, opportunities for 10,000,000 of our people to go there and develop those great resources and build their homes and create the industries which sustain them through all the years to come.

"But there is this difference between Montana and the three states with which it has been compared. Throughout those three states the rich prairie lands were capable of agricultural production in their natural condition without irrigation. The ingoing settler needed only to break the sod and plant his crop and reap the harvest. The individual could cope with every problem necessary to build a home for himself, and the creation of the many homes which, in the end, created communities and built cities and made states, was the natural aggregation of the work of many individuals without the necessity for aid from the government to overcome difficulties which nature had put in the pathway

of man in his efforts to subject to his needs the natural resources of the country.

"In Montana it is different. The natural resources are all there. And they are even greater than in any of the prairie states. The mountains of Montana are robed with magnificent forests and filled with rich minerals. Gold and silver and copper and iron, and almost every commercial mineral, exist in enormous quantities. And from the base of her mountain ranges vast plains stretch away and lie before the eye of the traveler as he watches for mile after mile from the window of a fast moving railroad train. Those great plains—not only the level valleys along the river bottoms, but the high prairies and bench lands as well—are rich in every element of productive fertility, with the single exception of water. Nature sends the water, but does not distribute it over the land at the right time to produce crops. The rains fall upon the high mountains, the heavy snows mantle them with thick robes of white, and fill the rivers when they melt in the spring, and unless these waters, which now run to waste in times of flood, can be harnessed by the hand of man and let out upon the rich and fertile plains and used to irrigate them, those plains must forever remain to a very large extent waste and desolate and uninhabited."

And Mr. C. J. Blanchard, of the United States Reclamation Service, after traveling many hundred miles in his investigations in Montana, says: "Montana is justly proud of her high place among the mineral producing states of the nation, but she has a much more valuable asset to which she has as yet given but little heed. I refer to the water flowing in the splendid rivers and streams. With her vast areas of bench and valley lands wanting only the magic kiss of water to become as verdant as the valley of the Nile, these streams are capable of creating agricultural products exceeding greatly the value of the output of her mines.

"Today only 1.2 per cent of Montana is irrigated; yet the value of irrigated products exceeds \$1,400,000 annually, and 60 per cent of these products are hay and forage crops. The average value of irrigation crops in Montana is only \$9.63 per acre, as compared with \$13.88 in Utah, \$20.05 in Washington, and \$28.47 in California.

"From an agricultural standpoint Montana has gone beyond the prospector's stage of development, and her citizens as a rule do not show a proper appreciation of the really wonderful natural resources of the state. Land and water are in abundance nearly all over the state, and both so advantageously situated that bringing them together costs less here than in almost any of the arid states.

"Montana has more water and requires less for irrigation than any other state in the arid region. Here is a state with more than 95,000,000 acres, and you can count upon the fingers of one hand all the sections in which irrigation has been developed on a scale comparable with its application in other states.

MONTANA'S FUTURE.

"Montana's future position among the sisterhood of states depends very largely upon the careful regulation and intelligent distribution of the surface waters of the state. The lawmakers have, in this subject, matter worthy of their most earnest and careful consideration.

"Litigation over water rights in the west has cost more than the canals. Laws carefully framed now will save millions in the years to come when water will be Montana's most precious mineral. A private monopoly of a stream by a private individual or a corporation should not be tolerated. The water should be appurtenant to the land and no man should be permitted to have more than he can put to beneficial use."

To this I will only add that after twenty-five years of travel over this great State, I am convinced that all our arable lands can be irrigated—every arid acre that can be utilized for grain or grass can be reclaimed, and if the Reclamation Service succeed in making practical the great government enterprises now actually begun, and if our own State awakes to a sense of the importance and incalculable benefits of systematic irrigation, the time need not be long delayed when the millions of acres that now yield only wild grass, or possibly but sage brush and cactus, will be occupied by prosperous and content farmers, and to this end we are willing to extend the hand of welcome to all legitimate enter-

prises, whether individual or co-operative, State or Federal, agencies initiate them.

RECOMMENDATIONS.

1. If the Carey Land Act Board or any similar Commission be expected to enlist capital from other states—or if it be contemplated that through any agency outside capital is to be invited to come to our aid in the reclamation of our arid lands—it would seem wise to so amend the law with reference to the “right of eminent domain” that such an individual or corporation shall have the same rights as are conferred upon railroads. (See Section 923 of the Civil Code).

2. The time is now at hand when the several states in which government irrigation enterprises are being inaugurated shall provide, by some preconcerted method whereby the general government may exercise uniformity of action in the several states during the constructive period of any canal project—as expressed by D. H. Anderson, of the “Irrigation Age”: “All Federal laws must be of uniform, general application or operation, however special they may be in their intent. Now, if the Federal law is made general it is bound to result in a contract with a buyer of land in some state where there is a conflict with the state law. But, the buyer holds a title, clear, and the government has nothing more to do with him. He is under the state laws. If his contract conflict with these, where will the controversy be adjusted? To attempt to make a Federal law that will conform with the laws of all the states in which it operates is impossible now. Some body of men should be legalized to bring about uniformity in the irrigation systems before the effects of the present system are felt. Such a body of men should be representative of the persons directly concerned. The system adopted should make it possible for every man in every state to receive his water right in the same legal manner.” This question might as well be suggested first by Montana as by any other state, and while the various legislatures are in session it might not be unprofitable to make to each such representation as would insure at least some consideration of this question.

3. We will no doubt be confronted, as other states are, with questions of an inter-state nature, and I would suggest that an arrangement be provided for with the sister states on our borders, whereby the theory of the Supreme Court decision may be carried out, namely: that "priority of right should be recognized regardless of state lines." A compact is now proposed between Wyoming and Nebraska, whereby the principles now recognized by each state, independent of the other, may be recognized in a joint determination of rights on inter-state streams.

MEASUREMENT OF WATER.

In gauging of streams or measuring of ditches or canals the unit used by the government (as well as also by the law of most of the states) is the second-foot, or sometimes the expression is had by the acre-foot; the inch having been very generally superseded. The inch as a unit of water measurement is a product of the exigencies of western placer mining, which, strange enough, had undisputed sway in all placer mining regions, and very naturally found recognition and very general use when these same men engaged in agricultural or the same ditches passed over to the process of irrigation.

The "inch" was the amount of water that could be delivered through a hole, one inch square, in a vertical board dam, under a certain pressure, varying in different localities; that the water approaching and lying against the board dam was made to stand four, five or six inches above the center of the opening, when it was said to have a four- five or six inch pressure. This difference in "pressure" is found in the various localities where the system arose, and hence, when the legislatures of the various states adopted the "cubic foot per second," commonly spoken of as the "second-foot," there were various equivalents, as the following will indicate:

In Colorado—One second-foot, 38.4 statute inches.

Montana—One second-foot, 40 statute inches.

Idaho—One second-foot, 50 miners' inches.

Arizona—One second-foot, 40 miners' inches.

Nevada—One second-foot, 50 miners' inches.

Utah—One second-foot, 50 miners' inches.

A second-foot is one cubic foot of water every second. If a stream deliver at any given point 40 cubic feet of water per second, then that stream is said to carry 40 second-foot, or—in Montana—1,600 inches of water.

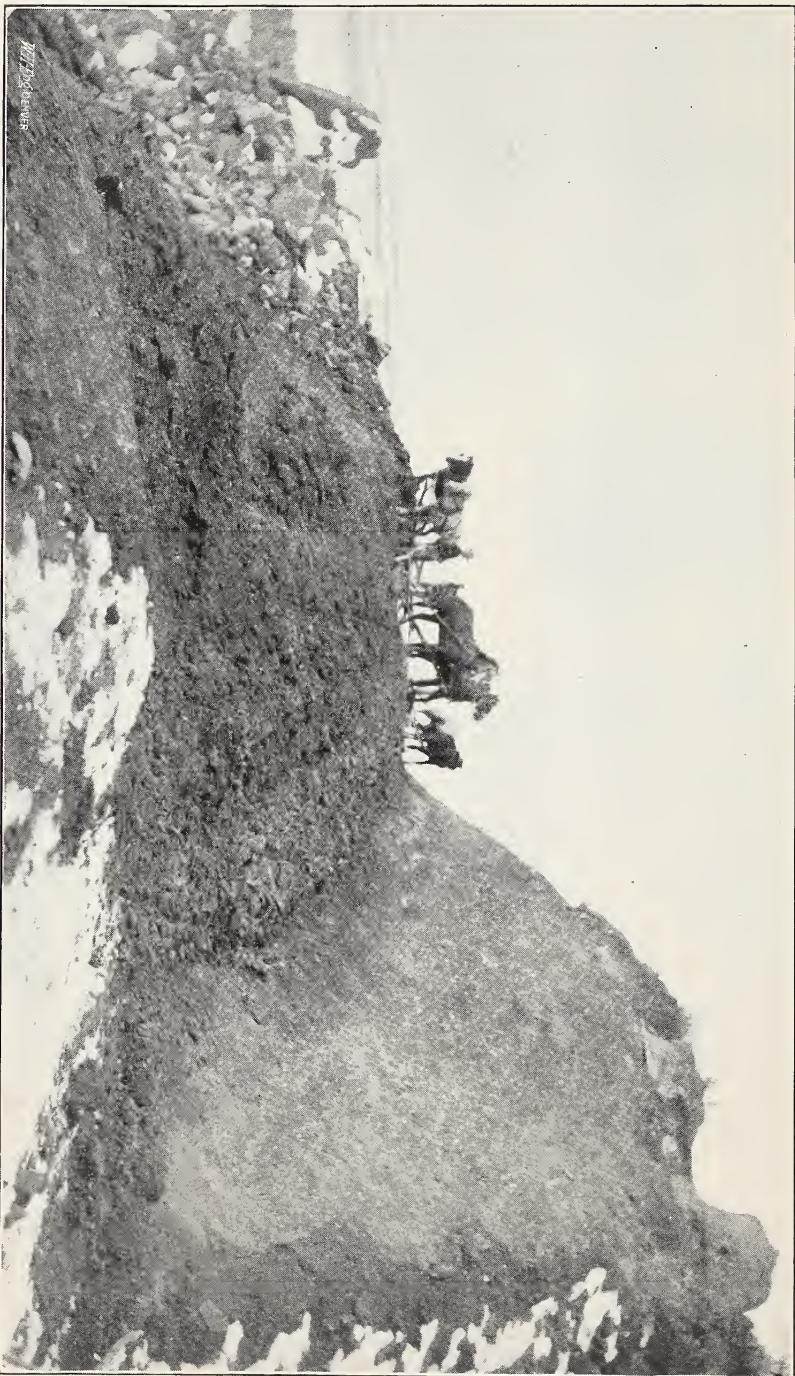
The acre-foot is becoming more and more a unit where vast quantities of water, either applied or stored, are to be considered. The second-foot is being uniformly used in case of a flowing stream, whether natural or artificial.

An acre-foot is the quantity of water necessary to cover one acre of land one foot deep.

Very respectfully submitted,

JOHN W. WADE,

State Engineer.



SIDE HILL WORK ON CANAL OF BILLINGS LAND AND IRRIGATION COMPANY, JUST NORTH OF BILLINGS.

Draft
OF THE
BILLINGS LAND and IRRIGATION CO's.
Lands and Canal
YELLOWSTONE COUNTY, MONTANA.

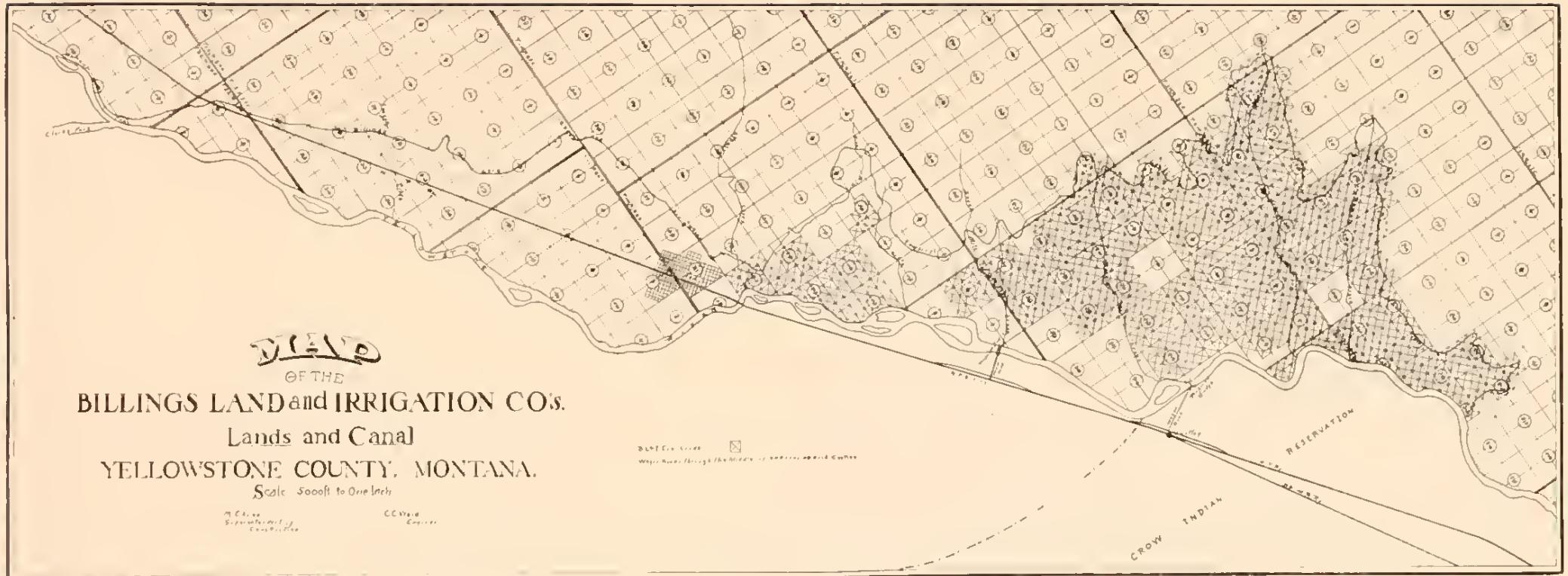
Scale 5000ft to One Inch

M.C. &
Superintendent
Construction

C.C. Ward
Engineer

Draft Copy Grade
Water Main through the Middle of Irrigation Canal

CROW INDIAN
RESERVATION



Report of Carey Land Act Board.

OFFICE OF THE CAREY LAND ACT BOARD.

Members—

John W. Wade, State Engineer, Chairman.

Geo. M. Hays, Secretary of State.

W. Hudnall, State Examiner.

Secretary of Board, F. H. Ray.

Helena, Montana, November 30, 1904.

To Governor Jos. K. Toole.

Sir:—Following is a report of the Carey Land Act Board, covering the period from its organization, April, 1903 to date.

The bill for creation of this Board as introduced in the Eighth session empowered the Board to investigate and, if found practicable, undertake projects for reclaiming any part of the 1,000,000 acres of arid land granted to the State by an Act of Congress, approved August 18, 1894, commonly known as the Carey Act. As enacted the law restricted the Board's powers to three unfinished contracts made by its predecessor, the State Arid Land Grant Commission, with the United States Department of the Interior.

These unfinished contracts were designated as District No. 1, near Billings, containing 10,632 acres; District No. 2, near Big Timber, containing 50,362 acres, and District No. 4, in the northern part of Lewis and Clark county, commonly known as the "Dearborn Canal," where 36,636 acres were segregated. These districts will be taken up in their order and a condensed statement of our action with each will be made. A detailed history of all matters and transactions is deemed unnecessary, since contracts, maps, etc., are on file in our office.

DISTRICT No. 1, Billings, 10,632 ACRES.

Soon after organizing, in April, 1903, the Board met in Billings a Citizens' Committee, investigated conditions and discussed reclamation with W. T. Clark, of Seattle, and associates. Subsequently negotiations with these parties resulted in a contract, dated December 31, 1903, for the reclamation and settlement of this district.

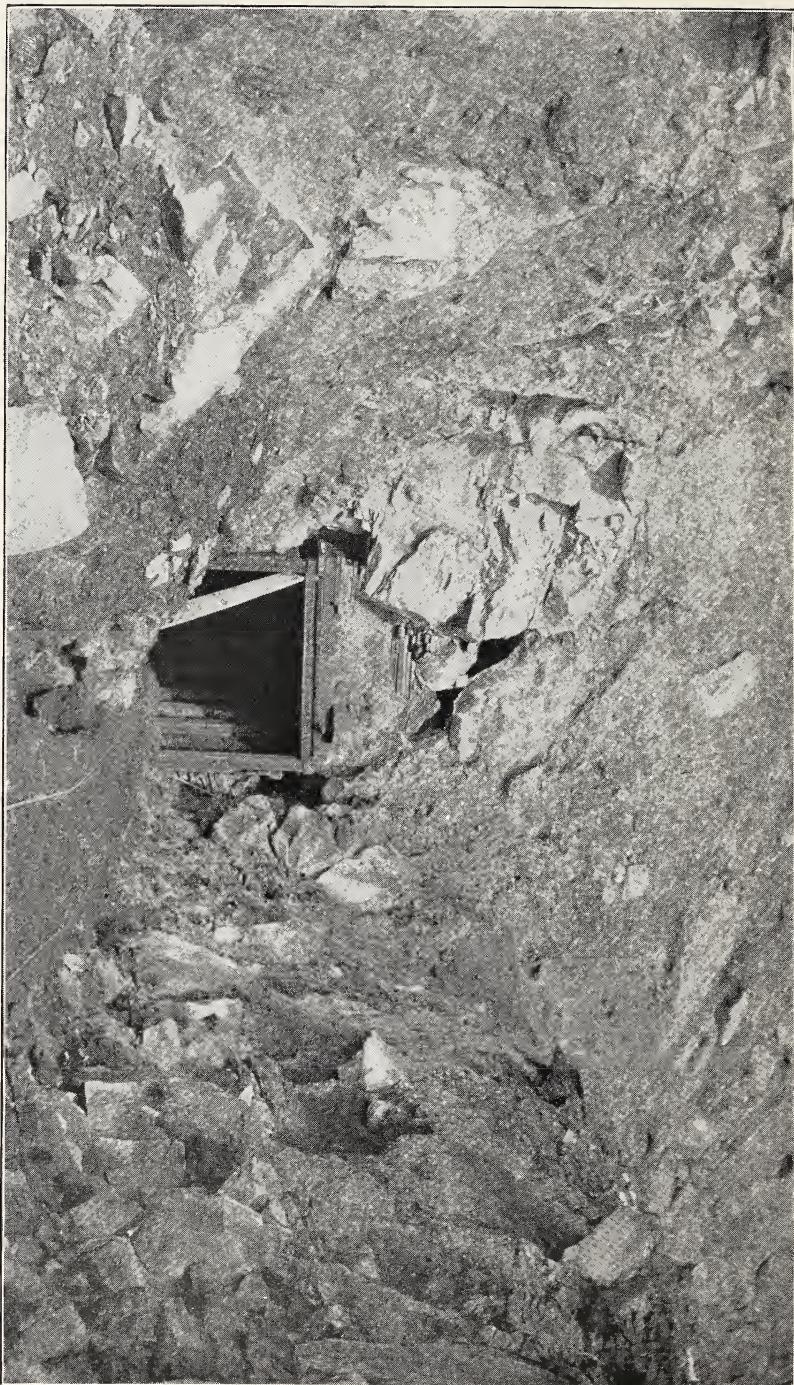
Briefly, this contract provided for the construction, by the Billings Land & Irrigation Company, upon plans approved by the State Engineer, of a complete and adequate irrigation system for the reclamation of District No. 1, the work to begin on or before January 1, 1904, and to be prosecuted vigorously and continuously. The land is divided in three parts; all in Division 1 is to be reclaimed and *settled* on or before three years from January 1, 1904; Division 2 is to be reclaimed on or before January 1, 1908, and Division 3 on or before January 1, 1909. The settlement, i. e., the sale of lands to bona fide settlers who pay for and cultivate the same, is, on Divisions 2 and 3, to proceed with due diligence. The State is to receive \$2.00 cash per acre for all land sold and 160 acres is the maximum sold one person. No sale will be accepted unless purchaser has obtained an adequate and perpetual water right appurtenant to the land. Inasmuch as the contractor must obtain settlers for Division 1 within three years, no restriction, on the rate per acre to be asked for water right, was made, the opinion of the Board being that competition would regulate the price. The charge of settlers for maintenance and operation expenses is limited to \$1 per acre per year.

In event of failure to comply with the contract, the works constructed, with all appurtenances, may be acquired by the State at an appraised price.

The contractor has shown much zeal in this enterprise and has advanced much more rapidly than contract calls for.

Physical Features of Canal : The line of this canal as now surveyed will be approximately 70 miles long. Of this distance about 35 miles or a little over, carrying the canal down to a point near Thirteen-Mile gulch, is now completed and will be ready to deliver water next spring to any and all lands

SOUTH PORTAL OF TUNNEL OF BILLINGS LAND AND IRRIGATION COMPANY, SHOWING TEMPORARY TIMBERING. TUNNEL TO HAVE SOLID ROCK FOUNDATION. SIZE 7X8 FEET. LENGTH 1847 FEET.



between Billings and Twelve-Mile. Construction of laterals to reach these lands is under way, of which there will be when completed over 30 miles. Construction of additional mileage will proceed as fast as settlement of lands demand. The canal to this point is of sufficient capacity to cover the entire tract, namely, about 40,000 acres. Among the engineering features is a tunnel 1,847 feet long, 7x8 feet, on a grade of 10 feet to a mile, with a capacity of 500 second feet. A 600-foot trestle, carrying a flume 6x10 feet inside. Another trestle is 900 feet long, average 60 feet high; capacity, 500 second feet. This trestle is supported by posts 10x10 inches, full length from the ground to flume bed, made of Puget Sound fir, every post resting on a concrete foundation 3½ feet deep by 3 feet square. This is one of the strongest and best flumes constructed for irrigation in the entire west.

This canal, so far as completed, is thoroughly puddled and primed and will be in good carrying condition next season.

Of the land under contract with this Board about 4,000 acres will be covered by the line as now completed.

The total acreage that this canal will cover when completed will be as follows:

State lands (Carey Land Act Board)	10,440 acres
School and University land	2,220 acres
Railroad	12,680 acres
Private ownership	4,140 acres
Unsurveyed	5,120 acres

Total east of tunnel 34,580 acres

In addition, the canal has sufficient capacity to furnish water to lands west of town, 4,000 acres.

There is tributary to the canal also, across the river, for which we have capacity, 3,000 acres. This last would require construction of a large pipe line.

The line of canal as now surveyed and being constructed is nearly parallel to but considerably higher than the survey as made by the State Arid Land Grant Commission, and will cover several thousand acres more:

DISTRICT NO. 2, BIG TIMEB, 50,362 ACRES.

This district was organized in 1898, and consists of about 13 miles of canal, with water rights and rights of way, which were purchased from the Holland Irrigation Canal Company and paid for by issuing \$100,000 in bonds that are also a lien on all the segregated lands in District No. 2, viz.: 50,362 acres.

On July 27, 1899, a proposal from the Holland Irrigation Canal Company to reclaim and settle lands in District No. 2 at \$12.50 per acre, payable in bonds, was accepted by the State Arid Land Grant Commission, under which some work was done and \$32,000 in bonds issued. No land was reclaimed and the contract lapsed, after a second extension, May 15, 1901.

The financial status of this district was reported to Your Excellency January 20, 1903, by State Examiner W. Hudnall, who referred to the \$132,000 bonded debt as excessive and preventing the successful negotiation of additional capital. The Examiner's recommendation that an effort to exchange these bonds (which were all controlled by Mr. Francis Schell, of New York City), for the canal, water rights, etc., was approved by the Legislative Committee on State Lands. In June, 1903, the Board began correspondence with Mr. Schell for the purpose of obtaining this \$132,000 bond issue. His letters indicated a willingness to make an exchange providing an arrangement could be made for disposing of some allied land interests at the same time.

Subsequently the Board interested the Securities Company, Limited, in the project and November 10, 1903, entered into an arrangement with said company to reclaim and settle District No. 2, contingent on obtaining the outstanding bonds and thus removing a cloud on the title. A member of the Securities Company, Limited, called on Mr. Schell in New York City to complete arrangements, but owing to the changed views of Mr. Schell nothing was accomplished. A quite lengthy correspondence ensued without result. Meantime, with the approval of the Board and Attorney General Donovan, Mr. T. J. Walsh, attorney for the Securities Company, Limited, had investigated the legal status of District

No. 2 and these bonds. His views are stated in a letter addressed to Your Excellency, June 10, 1904, which was later transmitted to this Board. At a meeting July 28, 1904, the Board discussed this letter, considered the Governor's views and the failure of more than a year's faithful efforts to effect a return of the bonds. Believing that legal action would be necessary to obtain results, the Board adopted the following resolution:

Resolved, (1) This Board, after a conference with Governor Toole, concurs in the opinion that good public policy requires an early determination by Court decision of the questions involved; (2) that subject to the consent and approval of Attorney General Donovan, Mr. T. J. Walsh is authorized to co-operate with the Attorney General in beginning at once and prosecuting such legal proceedings as they deem best, it being understood that the State is not obligated to Mr. Walsh for any fee or expense incurred, and that he shall look to said Securities Company for compensation.

The action thus authorized was instituted October 30, 1904, in Sweetgrass county, against the Holland Irrigation Canal Company, Francis Schell, and the Farmers' Loan & Trust Company of New York City, the purpose being to have the courts declare null the bonds issued (\$132,000) under the contract for the reclamation of District No. 2, and thus remove the cloud upon lands which had not been reclaimed.

In the event a judgment for the State is obtained, then reclamation and settlement of this district will proceed under an agreement dated October 22, 1904, between the Securities Company, Limited, of Montana, and the Carey Land Act Board, which is supplemental to the contract of November 10, 1903.

Briefly, this contract provides for the construction of a canal and other adjuncts for the reclamation of District No. 2 and the settlement of not less than 5,000 acres per annum until 20,000 acres have been settled, and the balance of land suitable to be settled on or before December 1, 1913. Construction work to begin within one year from date of adjustment of outstanding bonds and to proceed with such force and means as will, in the judgment of the State

Engineer, insure its completion within three years from commencement. The beginning of settlement of said lands to be not later than eighteen months from date of cancellation or adjustment of the \$132,000 outstanding bonds. Lands to be classified and prices for same to be paid State per acre, viz.: 1st class, \$2.00; 2n class, \$1.50; 3d and 4th classes, 50 cents. When lands are filed on 25 cents per acre shall be paid and this shall be deemed settlement; the balance of purchase price, with 7 per cent interest, shall be paid in one year from December 1st of the year following delivery of water.

Current Revenues and Expenses of District No. 2:

Prior to the creation of this Board water rents from District No. 2 were not paid into the State, but were collected and disbursed by the Holland Irrigation Canal Company, who had the reclamation contract.

When the canal came under our supervision it was in bad order and no funds were available for repair, so the Board made an agreement with settlers in the district to do some repairs to distribute the water for 1903 and to apply their 1903 dues for water to payment.

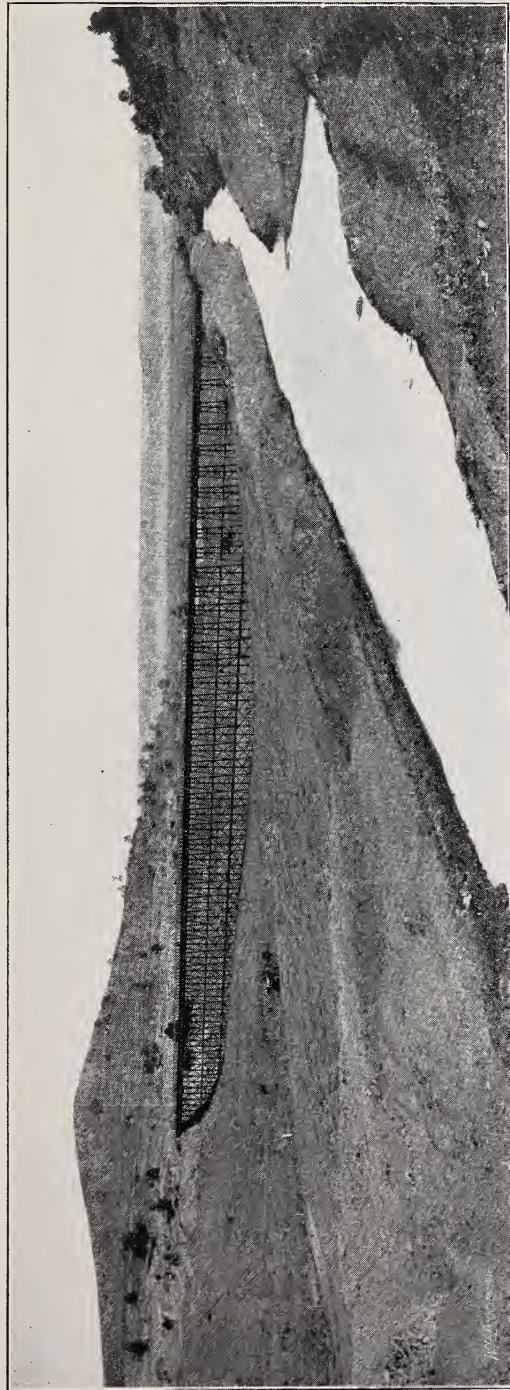
The only cash received during 1903 was \$100 for water used by H. C. Pound on other than Carey lands. The cash expense was \$48.75.

During 1904 a water rent of \$2.00 per inch was charged, the total collections for the season being \$678.85, while the bills for repairs and ditch tending amounted to \$659.58, which does nto include any part of the Board expenses. This will leave in District No. 2, Fund C, a net balance of \$70.52 after payment of outstanding warrants against this fund.

DISTRICT NO. 4—COMMONLY KNOWN AS DEAR-BORN CANAL.

This district was organized in 1900 and includes 36,536 acres of segregated land.

On December 28, 1900, the State Arid Land Grant Commission let to L. D. Beary a contract for the reclamation and *settlement* of this district at \$12.50 per acre, to be completed by June 1, 1904, and paid for in bonds of said district



FLUME NO. 3. ACROSS ALKILI CREEK, LENGTH 900 FEET, JUST NORTH OF TUNNEL. AVERAGE HEIGHT 60 FEET.

on the Engineer's estimates. The contractor was obligated to deliver a deed of "the right, title and interest of the Dearborn Canal Company in and to the water or use of waters of the Dearborn river for \$1.00 upon delivery to him of bonds of District No. 4 in payment for first estimate of work already performed." The Dearborn canal, constructed in 1900, was embraced in the Engineer's first estimate, April, 1901, for which \$131,800 of District No. 4 bonds were issued to the contractor, L. D. Beary.

On September 10, 1901, L. D. Beary assigned this contract to the Deorborn Canal Company, of which Henry Semple Ames is secretary.

Upon the Engineer's estimates there was an additional bond issues of \$51,000 in September, 1901, and of \$25,000 in January, 1903, the total issue being \$207,800, *all issued prior to the creation of the Carey Land Act Board*, of which \$20,000 is held in trust by the Union Bank & Trust Company, Helena, for the State as indemnity for the faithful performance of the contract.

Immediately after organizing, the Board began a search for this assigned contract, but not until June was it found. Plans and specifications referred to in this contract have never been found and their absence embarrassed the State Engineer in arriving at conclusions.

Mr. Ames, secretary of the Dearborn Canal Company, assignee of this Beary contract, had a conference with the Board in May, 1903, at which he explained that reclamation of *all* the lands was not financially or physically feasible under the original plans and for that reason construction work had ceased the previous year pending a determination of the best method.

Prior to the conference with Mr. Ames the Board had been unable to find the missing contract or plans, or get a copy, so it was not informed as to the requirements thereof. After the lost contract was found the Board wrote Mr. Ames, June 17, 1903, that the progress of reclamation and settlement called for by the contract was not being maintained. The chairman of the Board, on July 6, 1903, after a cursory inspection of the canal, wrote Mr. Ames, calling attention

to the very short time left in which to complete the contract and asking what the Board could do that would hasten the remaining work, as it was not satisfied with the progress made. A quite voluminous correspondence ensued. Mr. Ames produced reports, made in 1902, by his engineer, Mr. Knox, and on November 20 he suggested the contract be extended three years as to further construction and until June 29, 1910, as to settlement. The Board, in a letter December 23, declined to grant this extension, but proposed to extend the time of settlement under certain conditions and requested the return of some District No. 4 bonds which it alleged had been issued in excess of the amount earned under the contract. To this Mr. Ames replied, January 16, 1904, differing with the Board's views as to the issue of bonds. He also stated that his position as to the completion of the work covering the 22,000 acres on Sim's creek had all along been "that the plan called for by the contract would be physically inadequate and therefore useless." Further, that his engineer, Mr. Knox, and Engineer George T. Wickes, acting for the State, had agreed the original plans were inadequate; that suggestions as to new works that were physically feasible were financially impossible, and consequently, "with the opinion of Mr. Knox before me, I am not willing to spend any more money in carrying out the original plans, but as I have stated, if a financially and physically feasible plan can be suggested I should be glad to complete the work."

Meantime an examination of the canal and lands was being made by State Engineer John W. Wade, assisted by Engineer George K. Reeder. A report covering this examination and other pertinent facts was made March 24, 1904, approved by the Board, and reference is hereby made to said report for details of the physical and financial conditions of District No. 4.

Briefly, the canal consists of three sections aggregating a little more than 26 miles. No exact data existed at the time of the examination as to the amount of water available in the Dearborn river, from which Dist. No. 4 diverts its supply. A measuring station was established in July, 1903, so that this important fact can be ascertained. An estimate, based

on the best information obtainable, was 125 second feet (5,000 inches) during the irrigating season. The capacity of various sections of the canal, after taking out numerous humps on the grade, will range from 233.9 second feet down to 74.1 second feet. A large part of the construction work does not comply with the contract.

Patent to a portion of these lands was applied for by the State Arid Land Grant Commission and on November 11, 1903, a patent was issued to the State for 10,104.3 acres. Much of the patented land is good and with sufficient water will raise excellent crops, but some is rough, rocky and hilly, and some is higher than the ditch. Probably not to exceed 75 per cent of the land now patented can be profitably irrigated.

The price at which this reclaimed land with perpetual water right was to be sold to settlers was fixed by law at \$15.00 per acre, plus 6 per cent interest from date of bond issue January 1, 1901.

The contract, as understood by the Board, called for settlement by June 1, 1904, and the contractor (Dearborn Canal Company) states that the expenses in efforts to obtain settlers aggregate over \$10,000. Several parties who applied and made several payments have defaulted since, and there are now but two settlers cultivating the land.

Over Issue of Bonds. As the contract is construed by this Board the contractors (Beary and the Dearborn Canal Company) were overpaid *by our predecessor*, who issued, on engineer's estimates, \$207,800 in bonds.

If the 10,104.3 acres patented was fully reclaimed and all settled, the total bond issue at \$12.50 per acre would be \$126,300. The amount which should be deducted from this for completing necessary laterals, correcting errors in construction and putting settlers on all this patented land, can not be accurately determined in advance, but a reasonable estimate is \$30,000. This bond issue should be, according to the Board's judgment of the contract, as follows:

10,104.3 acres, if fully reclaimed and settled, at \$12.50	\$126,300
Less—	
Estimated cost of completing reclamation and settlement	\$30,000
15 per cent retained as per contract, pend- in completion of entire contract.....	14,445
Indemnity held for performance of con- tract	20,000— 74,445
Net amount to be delivered to contractor	\$61,855
There has been delivered to contractor.....	\$187,500
There should have been delivered to the contractor as above	61,855

Therefore there should be returned by the contractor \$125,645

The above figures relate to *face of bonds only*. As these bonds were issued with interest coupons attached, the coupons would also be returnable. These approximate \$25,000.

On April 1, 1904, a copy of this report was sent to Mr. Ames, together with a copy of Your Excellency's letter to the Board, March 30, and a formal demand made to return the excess bond issue, \$125,645, to proceed to completion with the work of reclamation and settlement and to amend defects in construction which had been pointed out.

Mr. Ames' reply, April 14th, denied that any bonds had been illegally issued, stated that the bonds were owned by other parties, asked that the demand be withdrawn and that in lieu thereof the Board submit some plan acceptable to the State, the bondholders, and Mr. Ames, for a final settlement of the whole controversy, and said he was ready to confer.

A conference was arranged for and held, June 9th, 16th and 17th, attended by Mr. Ames, his attorney, O. W. McConnell, the Board, and Assistant Attorney General Mettler, yourself being present a part of the time. The proceedings on the 9th and 16th were reported stenographically and a transcript is on file in our office.

The views of Mr. Ames and the Board as to obligations of the contract were so divergent that no agreement was

reached. Attention was called to a provision in the contract for submitting disputes to an engineer umpire, and Mr. Mettler suggested that thereby some disputes as to physical facts might be eliminated and make possible submission of legal questions without other controversy, thus facilitating a settlement.

The Board on June 22d made a written proposal for selecting an engineer umpire, to which a reply dated July 5th, from Attorney O. W. McConnell, enclosing Mr. Ames' answer, was received. Instead of accepting arbitration, Mr. Ames desired to have a written opinion from the Attorney General upon what he designated as the principal question in dispute, viz.: whether the Board had a right to review the acts of its predecessor, the State Arid Land Grant Commission, and demand a return of a portion of the bonds issued by said Commission. Mr. Ames' letter with request for a written opinion was referred to Attorney General Donovan July 7th, but to date the Board has been unable to obtain his opinion. As Mr. Ames desired this written opinion before taking up the matter further, no progress has been made since July, nor is any likely pending receipt of the Attorney General's opinion.

Current Expenses and Receipts of District No. 4.

Prior to organization of this Board water had been supplied from the Dearborn canal to private lands, outside of District No. 4, and collections therefor made by the contractor, who cared for distribution and repairs, but rendered no accounting to the State.

Section 3548 of the Political Code (Session 1897) requires such revenues paid into Fund C of the district, and for that reason the Board assumed charge of water rentals and collections. These collections amounted to \$775.50 for 1903 and so far in 1904 to \$867.80. This sum will be increased \$239.50 by three delinquents.

During 1903 the superintendent in charge of repairs and distribution was employed and paid by Mr. Ames, secretary, who wished to have his man in charge so as to aid in obtaining settlers. For this and sundry repair items there has been no settlement with Mr. Ames. He rendered a state-

ment, with vouchers, of Dearborn Canal Company expenses, several items of which were not properly chargeable to the State, and asked an apportionment and settlement. Pending adjustment of the State's claims against the Dearborn Canal Company the Board declined to pay this claim.

For 1904 the expense for superintendence and repairs amounts to \$240. This is exclusive of the Board's expenses.

RECOMMENDATIONS.

Obviously the State will be greatly benefited by any agency that results in reclamation of its arid land.

Other states, notably Idaho and Wyoming, have profited largely by availing themselves of the 1,000,000 acre grant under the Carey Act. That Montana is profiting in smaller measure is due to several factors, one of which was legislation (since repealed) that handicapped the Arid Land Grant Commission, and subsequently the failure to give our Board power to enter upon new projects.

Our vast arid area and unused water present ample opportunity for reclamation by all three agencies, viz.: A national irrigation law; the Carey Act, made effective by an adequate State law; and lastly, private enterprise.

The national government has had under way for three years one large project in Montana, the St. Mary's lake and Milk river canal, which will require more than Montana's proportion of the reclamation fund. The funds now available, plus the estimated income for 1905, aggregating \$27,000,000, have already been tentatively allotted to work now proposed, so that additional government enterprises in Montana are not likely to be undertaken soon.

Under these conditions the State would be acting wisely by immediately empowering this Board to investigate—and if found practicable have undertaken—new reclamation projects under the Carey Act.

Results in District No. 1 show that it is practicable and profitable for the State to promote reclamation. Only legal complications in District No. 2, originating before this Board, have prevented substantial progress there. These complications are likely to be adjusted within the next three

months, after which capital is ready to undertake that project.

When we advocate enlarging the powers of this Board we do not want the State to be in competition with the government, nor do we wish to put a straw in the way of federal reclamation service. In view of the fact that canals built by the government are to be sold to settlers at actual cost, without any interest, and payments extended over a period of ten years; and since no payment is due until after the water has been made available and may even then be deferred two years that the newly established settler may realize his payments from the soil reclaimed, we affirm it would be difficult to compete against government irrigation even if we were inclined to do so.

But the fact that the Government has already undertaken all it can under the national irrigation law for some years to come, and Montana's share of the reclamation fund being required for the Milk river project, it is apparent that unless the State undertakes irrigation for itself there will remain unreclaimed for years a large area of good arable land that by proper State effort would soon become homes for settlers. Besides this, it will appear upon even slight investigation, and become more evident upon fuller knowledge, that there is a large aggregate of Montana arid lands which the State may easily have reclaimed, yet which are isolated from other tracts, each too small to engage the government service, so that the government will not undertake their reclamation. These comparatively smaller tracts are logical fields for State enterprise and it is for such, if for no other, that we recommend the enlargement of the powers of the Carey Land Act Board. The longer this action is delayed, the more difficulties will be encountered by reason of private filings on water land, especially filings to use water for other purposes than irrigation.

Besides the benefits accruing to the State, directly and indirectly, from land reclaimed and settlers obtained, an additional reason exists for making possible a revenue from Carey land sales. As was shown in the report on the State Arid Land Grant Commission by State Examiner Hudnall,

January 23, 1903, through the operation of that Commission a warrant and open account indebtedness of \$18,697.45 (without interest) is owed to various citizens for money loaned, supplies furnished or services rendered. Some of these warrants are in the hands of innocent third parties; some are held by widows who can ill afford a loss.

The law under which the State Arid Land Grant Commission operated was explicit that no liability should attach to the State for debts incurred by the Commission. Section 29, Article V, of the Montana Constitution prohibits payment by the State "of any claim made against the State without previous authority of law." Under these circumstances the Legislature, even if disposed to, could not appropriate funds from sources other than sale of Carey lands to the payment of this \$18,697.

What can the Legislature do to relieve those citizens holding these warrants issued by the State Arid Land Grant Commission? Only one thing—which the Board earnestly recommends. That is: Put the State in a position to have more land reclaimed, by empowering the Carey Land Act Board to undertake new projects and then applying the proceeds from land thus reclaimed, first to payment of comparatively small expense incurred by the State, and second, to the \$18,697 warrants and open account debts.

Respectfully submitted,

JOHN W. WADE,
GEO. M. HAYS,
W. HUDNALL.

